



## Analysis of a practice management computer software program for owner compliance with recall reminders

Vicki J. Adams, Cheryl L. Waldner, John R. Campbell

**Abstract** — The purpose of this study was to describe clients' level of compliance with reminders that are computer generated and to identify factors associated with owner response to a recall. Client response to a recall notice revealed that clients responded to reminders for vaccination about 3 times less often than for the other recall codes combined (dental procedures, laboratory tests, medical progress examinations, and neutering). These results suggest that veterinarians need to move away from annual vaccination reminders and toward the promotion of preventive veterinary services, such as annual wellness examinations, screening laboratory testing, and routine dental procedures. Once a practice has committed to and set up the required computer systems to promote preventive veterinary care, the stage is set for the implementation and monitoring of recommendations and reminders. This type of practice philosophy and marketing coincides perfectly with an approach to maximizing compliance in all aspects of veterinary medicine.

**Résumé** — Analyse d'un programme informatisé de gestion de clinique pour accroître l'observance des propriétaires par des avis de rappels. Le but de cette étude était de décrire le niveau d'observance aux avis de rappel élaborés par ordinateurs et d'identifier les facteurs associé à la réponse du propriétaire à un rappel. La réponse des clients à un avis de rappel a révélé que les clients répondaient aux avis de vaccination 3 fois moins souvent qu'aux autres types de rappels combinés (examens dentaires, test de laboratoire, suivi médical et stérilisation). Ces résultats laissent entrevoir que les vétérinaires devraient faire la promotion des services vétérinaires préventifs tels que les examens annuels de santé, les tests de dépistage et les examens dentaires de routine plutôt que de la vaccination annuelle. Lorsqu'une clinique s'est engagée dans cette voie et s'est muni du système informatique nécessaire pour promouvoir les soins vétérinaires préventifs, la table est mise pour la mise en œuvre et le contrôle des recommandations et des rappels. Cette philosophie médicale et de mise en marché coïncide parfaitement avec un conception visant à maximiser l'observance dans tous les aspects de la médecine vétérinaire.

(Traduit par Docteur André Blouin)

*Can Vet J 2006;47:234-240*

### Introduction

As in other environments and businesses, computer technology is used to manage information in veterinary practices. Many clinics use veterinary practice management systems built on database platforms for client records and invoicing. Most veterinary programs include common core features such as invoicing, certificates, prescription labelling, inventory control,

appointment scheduling, vaccination reminders, appointment reminders, and recalls, as well as options for patient medical records, real-time stock level tracking, and purchasing reminders. These programs can generate a variety of reports that help to keep a clinic running smoothly. Most programs offer automatic reminders issued for follow-up treatments, vaccinations, and recommended procedures. The reminder system may be

Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, 52 Campus Drive, Saskatoon, Saskatchewan S7N 5B4.

Address all correspondence and reprint requests to Dr. Adams; e-mail: [vicki.adams@aht.org.uk](mailto:vicki.adams@aht.org.uk)

Dr. Adams' current address is Animal Health Trust, Centre for Preventive Medicine, Lanwades Park, Kentford, Newmarket, Suffolk, United Kingdom CB8 7UU.

This study was supported by grants from the Western College of Veterinary Medicine's Companion Animal Health Fund and Bayer Animal Health Canada.

programmable to automatically notify staff of the annual group of reminders that are due every month, or staff may be required to do a search and request a report from the client database. Both types of reminder system require practice staff to follow through on how and when clients are to be reminded.

As there are few studies of reminder systems in veterinary practice, one must look to the human healthcare field for published information on health utilization (appointment making and keeping, and use of preventive services). Numerous studies have been published that report on the response rates of both adult and pediatric patients to various appointment reminders, including specialist appointments made by general practitioners for their patients and other appointment-keeping behaviors in people. Compliance with appointments was found to be greater for patients with medical complaints (~80% compliance) (1,2) compared with appointments made for disease prevention or asymptomatic psychiatric patients (< 50% compliance) (3). Broken appointments are a major problem in human healthcare facilities (4). One review of appointment-keeping in people found that previous appointment-keeping, patient demographic characteristics, psychosocial problems, health beliefs, and situational factors have been associated with whether or not appointments are kept (5). Studies have shown that compliance with appointments can be significantly increased by the use of postal and telephone reminders (6,7). Letters or postcards have also been used to improve the rate of "well-child" appointments being kept (8). Another useful method of encouraging appointment-keeping is to schedule follow-up appointments in advance, while the patient is still at the clinic, and use postcards or telephone calls to remind patients of their scheduled appointments (9,10).

No published literature is available on the evaluation of veterinary reminder systems. Each veterinary software package offers different solutions to the promotion of preventive veterinary care, and the usefulness of a particular package in a specific practice involves compromise between what is ideal and what is offered by the program (11). Users of veterinary practice management programs often do not use, or know how to use, all of the features of a particular package. Calhoun (11) reports several areas where computer functions are commonly overlooked or underused, including monitoring sources and retention of clients, reminder systems, frequency of use of individual codes, and the generation of effective personalized invoices. Conversations between the primary investigator (VJA) and veterinarians in small animal practice in western Canada suggested that reminder systems appeared to be an under-utilized function of veterinary practice management programs. While many clinics reported that they used a computer reminder system, most did not seem to be tracking the use and success of reminders on a regular basis. These clinics were unable to quantify how well their reminders worked to bring clients in for recommended visits or procedures. Yet practices continue to use a reminder system that takes up staff time and practice dollars to create reports, print and mail reminders, and telephone clients, without any knowledge of a cost-benefit analysis for the usefulness and success of reminders.

In light of these observations, a study was designed to evaluate the effectiveness of a computer reminder system. The objectives of this study were to describe clients' level of compliance with reminders generated by a particular veterinary practice management program and to identify factors associated with owner response to a recall.

## Materials and methods

A local computer software company in Saskatoon, Saskatchewan, that supplies practice management software to veterinary practices (12) was approached to conduct a retrospective search of computer records for client recall codes. The primary outcome measure was whether clients responded to a recall and visited their veterinary clinic. Recall codes included in the database extraction search were reminders issued for vaccinations or annual examinations, recheck or medical progress examinations, neuter surgery, dental procedures, and laboratory tests, over a 12-month period in 2001 to 2002. These specific reminders were chosen as examples of veterinary recommendations that could be followed to assess whether or not a client visited the practice for the recommended visit after the recall notice had been sent out. As a result of the database extraction, a data set was generated for each of 6 clinics in western Canada that used the practice management software (12). For each recall event, the following data were obtained: date of recall, reason for recall, client identification and postal code, pet species and breed, number of pets in the household, number and value of client transactions in the previous year, whether the pet was covered by an insurance plan, whether the client bought pet food from the veterinary practice, and whether the client returned to the clinic in response to the recall and, if so, the date of the visit. Data were transmitted from the software company programmer to the investigator as individual spreadsheet (Excel, Microsoft Office 2000; Microsoft Corporation, Redmond, Washington, USA) files, 1 for each clinic. The files were merged into 1 large data set.

### Statistical analysis

Descriptive and univariate statistics were performed in a commercial software package (Statistical Package for the Social Sciences [SPSS], version 11.0.1; SPSS, 2001, Chicago, Illinois, USA). Response rates by clinic were compared by using analysis of variance and post hoc multiple comparisons. Analysis of variance was also used to compare recalls by species. Variables, as potential determinants of compliance, were constructed from items requested in the database searches (Table 1). Analysis of potential determinants of compliance was performed by using logistic regression in a commercial software package that allowed multilevel modeling (MLwiN, version 1.10.0007; Institute of Education, University of London, London, UK). Variables with  $P < 0.25$  in simple logistic regression were considered for inclusion in the multiple regression analysis. A manual forward selection strategy was used for regression modeling. Two- and 3-level models were run, using practice type and clinic as random effects, to examine the sources of variation in the data and to control for the effect of clinic and practice type (13).

**Table 1. Potential determinants of compliance constructed from items requested in the database searches with frequencies, descriptive statistics, and categories used in analysis**

Variable	Frequencies and categories for logistic regression			
Practice type	Small animal 4 (66.7%), Mixed 2 (33.3%)			
Clinic	6 individual clinics			
Pet species	Cats 1990 (31.7%), Dogs 4279 (68.3%)			
Breed	Crossbred 3755 (59.9%), Purebred 2514 (40.1%)			
Whether the client bought pet food from the veterinary practice	Yes 1017 (16.2%), No 5252 (83.8%)			
Whether the pet was covered by an insurance plan	Yes 0 (0%), No 6269 (100%)			
	Median	Minimum	Maximum	Categories for logistic regression
Number of pets in the household	3	1	38	1, 2, 3, 4, 5+
Years client with practice	5	< 1	26	< 1, 1-1.9, 2-4.9, 5+
Number of transactions in the previous year	2	0	650	
Amount of money spent in the previous year	\$142	\$0	\$9856	\$0 = no money spent, < \$1000, \$1000+
Amount of money spent per transaction	\$52	\$0	\$855	\$0 = no money spent, < \$100, \$100+

**Table 2. Descriptive statistics showing the numbers of clients' recalls sent out, visits (% response rate to recall), and clients who spent no money at the clinic in the previous year by clinic**

Clinic	Practice type <sup>a</sup>	Number of recalls sent out	Clients that visited clinic in response to a recall (% response rate)	Clients with \$0 value spent in last year
Alberta 1	Small	621	329 (53%)	137 (22%)
Alberta 2	Small	684	397 (58%)	173 (25%)
Alberta 3	Mixed	826	380 (46%)	131 (16%)
British Columbia	Mixed	1731	744 (43%)	611 (35%)
Manitoba	Small	1225	262 (21%)	608 (50%)
Saskatchewan	Small	1182	381 (32%)	311 (26%)
Totals		6269	2493 (40%)	1971 (31%)

<sup>a</sup>Practice type: Small = practice limited to small animals, these 4 practices were located in bigger cities. Mixed = practice includes both small animals and large animals, these 2 practices were located in smaller towns

## Results

Two of the clinics included were mixed animal practices located in small towns, the other 4 were exclusively small animal practices located in large cities. Observations that did not meet the inclusion criteria of being recall codes for dogs or cats were excluded from further analyses. Six observations that referred to herds of cattle or horses were excluded, as were 6 observations for ferrets. Three cases with recall codes for replacing rabies tags and 12 codes for doctor call-backs (reminders for doctor to telephone client) were also excluded, as these were not reminder codes meant to elicit a client visit for recommended preventive care. A total of 27 records were excluded, leaving 6269 observations available for analysis.

### Descriptive statistics

Forty percent (2493/6269) of clients who were sent a recall notice responded to a recall by visiting their veterinary clinic. The 6 clinics sent out recall notices to between 621 (10% of total number of clients included in practice database) and 1731 (47%) clients. Frequencies and descriptive statistics for the data collected are reported in Table 1. While 40% of all pets were purebred, this percentage was much smaller at 7% for cats (143/1990) compared with 55% for dogs (2371/4279).

Thirty-one percent (1971/6269) of clients had \$0 recorded as the amount of money spent over the past year and none of these clients had visited the clinic in response to a recall notice. Almost all (98% = 1924/1971) of these clients had been sent vaccination recalls. Response rate to recalls for each clinic varied from a low of 21% to a high of 58% (Table 2). The numbers of clients that had not spent any money in the past year are also shown in Table 2. Seventy percent (1379/1971) of the clients with \$0 recorded also had no transactions recorded, leaving 592 (30%) clients with \$0 recorded spent but anywhere from 1 to 105 transactions recorded. While it was not clear what was meant by these \$0 transactions, the system's computer programmer reported that some clinics set up an internal account for the generation of services that are not billed for but must be accounted for to maintain accurate inventory records. These accounts might have been used for discounts, services for employees, etc. There were also some cases where several hundred transactions worth several thousand dollars were recorded. These were most likely corporate accounts for pet stores, humane societies, etc. Table 3 shows the frequency of use of recall codes for each clinic. The majority of recalls were for vaccination and there were no significant differences in the types of recall codes issued for dogs versus cats (Table 4).

**Table 3. Frequency of use, in number (percent), of recall codes by clinic**

Clinic	Recall code					Totals
	Vaccination	Dental procedures	Recheck examination <sup>a</sup>	Laboratory testing <sup>b</sup>	Neutering	
Alberta 1	354 (57%)	127 (21%)	63 (10%)	77 (12%)	—	621
Alberta 2	599 (88%)	7 (1%)	47 (7%)	29 (4%)	—	684
Alberta 3	771 (93%)	55 (7%)	—	—	—	826
British Columbia	1716 (99%)	—	15 (1%)	—	—	1731
Manitoba	1204 (98%)	—	1 (0%)	20 (2%)	—	1225
Saskatchewan	961 (81%)	98 (8%)	48 (4%)	18 (2%)	57 (5%)	1182
Totals	5605 (89%)	287 (5%)	174 (3%)	115 (2%)	88 (1%)	6269

<sup>a</sup>Recheck examination includes reminders for postoperative reexaminations and anal glands

<sup>b</sup>Laboratory testing includes thyroid testing for cats and dogs, and phenobarbital and heartworm testing for dogs

**Table 4. Frequency, in number (percent) of types of recall codes for dogs and cats**

Species	Vaccination	Dental procedures	Medical progress	Neutering	Totals
Dogs	3773 (88%)	211 (5%)	234 (5.5%)	61 (1.5%)	4279 (100%)
			Recheck examination <sup>a</sup> 3% (130)	Laboratory testing <sup>b</sup> 104 (2.5%)	
Cats	1832 (92%)	76 (4%)	55 (2.75%)	1.25% (27)	1990 (100%)
			Recheck examination <sup>a</sup> 44 (2.25%)	Laboratory testing <sup>b</sup> 11 (0.5%)	
Totals	5605 (89%)	287 (5%)	174 (3%)	88 (1%)	6269

<sup>a</sup>Recheck examination includes reminders for postoperative reexaminations and anal glands

<sup>b</sup>Laboratory testing includes thyroid testing for cats and dogs, and phenobarbital and heartworm testing for dogs

There were no significant differences in the types of recall codes issued for dogs compared with cats (Mann-Whitney U test,  $P > 0.05$ )

### Analysis of potential determinants of compliance

Logistic regression was performed on 6079 cases with complete data. Whether or not the client visited the clinic (yes, no) in response to a recall was the outcome of interest. Analysis of potential determinants of compliance (Tables 1, 5) began with unadjusted univariable associations between potential determinants and the outcome, using simple logistic regression. Multilevel modeling was performed to examine the contribution of practice type and clinic to the variability in the data. A 3-level model with practice type as the highest level, followed by clinic and individual observations, suggested that practice type did not contribute to the variance ( $P > 0.99$ ). A final 2-level multiple regression model was fit with clinic as a random effect and with 6 independent significant predictors of compliance: number of years client had been registered with the practice, number of pets in the household, type of recall code, dollars spent at the clinic in the last year, whether pet food was bought from the clinic, and species of pet (Table 5). The only variables that did not enter the final multiple regression model were whether or not the pet was purebred or crossbred and the dollar value per transaction. There were no significant 2-way statistical interactions between any of the variables included in the final model.

To summarize the logistic regression model, clients who had been with a practice for  $< 1$  y were almost 5 times more likely to visit the clinic in response to a recall than clients who had been with the practice for  $> 5$  y, after adjusting for clinic, number of pets in the household, type of recall, money spent in the last year, whether pet food was bought from the clinic, and species of pet. The following results are the adjusted odds of

clients responding to a recall with a visit to the clinic after adjusting for the other variables in the model. Clients with only 1 pet were 1.2 times as likely to visit the clinic in response to a recall than were clients with 5 or more pets. Clients were twice as likely to visit the clinic in response to a dental recall, 20 times more likely to respond to a recall for a medical progress recall, 9 times more likely for laboratory testing, and  $> 3$  times less likely to respond to a recall for neuter surgery, than for a vaccination recall. Clients who spent \$1000 or more at the clinic in the past year were more than 6 times more likely to respond to a recall than clients who had spent less than \$1000 in the past year. Clients who did not spend any money in the past year were 250 times less likely to respond to a recall than clients who spent up to \$1000. Clients who bought pet food from the clinic were almost twice as likely to respond. Finally, clients were 1.5 times more likely to respond to a recall for a cat than for a dog.

## Discussion

If part of a practice's marketing strategy is to retain existing clients and provide needed services to their pets, then a method of tracking the progress of reminders and trends in recall behavior of clients is required. It is not enough to simply send out reminders for recommended services. The ideal situation would be one in which a practice's software program evaluated the reminder system and kept statistics on the ways clients responded to reminders. Identifying characteristics of clients who respond and do not respond to reminders would allow for modifications to the reminder system that could potentially increase



**Table 5. Variables associated with the odds of clients responding to a recall by visiting the clinic<sup>a</sup>. Total *n* = 6079 cases with complete data**

Determinant of compliance		Did client visit clinic?		Adjusted odds ratio and 95% confidence interval		<i>P</i> -value
Variable	Level	Yes	No	OR	95% CI	
Years with practice	< 1 y	258	81	4.8	3.1–7.5	< 0.0001 <sup>c</sup>
	1–1.9	278	771	0.66	0.53–0.81	0.0001
	2–4.9	520	1002	0.83	0.70–0.99	0.036
	5+	1359	1810	Referent <sup>b</sup>		0.001 <sup>b</sup>
Number of pets	1	289	158	1.2	0.79–1.8	0.4
	2	724	1583	0.61	0.49–0.76	< 0.0001
	3	519	988	0.61	0.49–0.77	< 0.0001
	4	328	409	0.77	0.60–0.98	0.4
	5+	555	526	Referent		0.01 <sup>a</sup>
Recall code	Dental	178	108	2.0	1.5–2.8	< 0.0001
	Medical progress	159	8	21	10–44	< 0.0001
	Laboratory testing	90	25	9.7	5.3–18	< 0.0001
	Neutering	34	52	0.30	0.17–0.53	< 0.0001
	Vaccination	1954	3471	Referent		< 0.0001
\$ spent in last year	\$0	10	1891	0.004	0.002–0.01	< 0.0001
	< \$1,000	1773	1654	Referent		< 0.0001
	\$1,000 +	632	119	6.4	5.0–8.3	< 0.0001
Pet food bought from clinic?	Yes	617	350	1.8	1.5–2.2	< 0.0001
	No	1798	3314	Referent		< 0.0001
Species	Feline	829	1099	1.5	1.3–1.8	< 0.0001
	Canine	1586	2565	Referent		< 0.0001

<sup>a</sup>Final model from multiple logistic regression with clinic as random effect in a 2-level model

<sup>b</sup>Referent refers to the category of the variable to which all others are compared (OR = 1.0) and its associated *P*-value from the likelihood ratio for inclusion of the variable in the model

<sup>c</sup>Wald *P*-value for individual levels of a variable

Intercept: *B* = 0.03 Standard error (*B*) = 0.26

Variance estimate for clinic: *B* = 0.35 Standard error (*B*) = 0.21 *P* = 0.09

client response. Getting clients to visit the practice is the first step in increasing compliance with recommended preventive care. In the present study, 40% of clients responded to a recall notice by visiting the clinic, which is within the recommended 40% to 50% response rate to a 1st reminder (11). Calhoun (11) recommends that practices should realize an additional 10% to 15% response after the 2nd reminder and another 5% to 10% after the 3rd reminder. The response to a 2nd and 3rd reminder was not evaluated in this study.

A major issue affecting veterinary practice is the under-delivery of needed care. If a practice's computer system can help more clients to follow veterinary recommendations, then the practice will benefit more patients. Calhoun (11) suggests that better use of computers in veterinary practice will increase client retention and client compliance with recommendations. The findings of this study support this view and indicate that client databases need monitoring and maintenance to maximize the efficiency and effectiveness of the reminder system. The rather large proportion of clients that were recorded as having spent no money at the clinic in the last year and that did not respond to a recall notice suggests that these may be inactive clients that have either dropped out of care or have started visiting another practice. Sending out recall notices to clients who have not visited the practice in the past year is likely to be an inefficient use of resources. In conversations with practitioners, one commonly hears that final reminders are often sent out that include a warning to the client that if he or she does

not respond to the notice, he or she will be dropped from the clinic records. What these same practitioners also say is that they rarely, if ever, follow through and delete nonresponding clients from their computer systems. This could be one explanation for the number of clients with no transactions recorded who were sent recalls. Clients who did not spend any money at a practice in the last year may have been less likely to respond to a recall notice because they no longer considered themselves to be clients of that practice. Often, clients in areas with several practices will have visited a practice once or a few times and then decided to go to another practice. Clients who "clinic hop" for various reasons end up being registered in > 1 clinic database. For example, those owners that had been clients for 1 to 5 years may have been part of a "clinic hopping" group of clients that were not deleted from the practice database. Clients registered with a practice for < 1 y or > 5 y may have been more likely to be regular, active clients of just 1 clinic. Clients who spent \$1000 or more in the previous year may have been more committed to their pets or could afford to return to the clinic for recommended preventive care. This could also be true for clients who bought their pet food from the veterinary clinic.

It is difficult to explain why clients with 2 or 3 pets would be less likely to respond to a recall than clients with 5 or more pets. Possibly, clients with multiple pets may either have wanted to bring in several pets together for convenience or have not been able to bring in > 1 pet

at a time; thus, these clients did not then respond consistently to a recall for vaccination for a single pet.

Given that cats are increasing in popularity as pets and may even outnumber dogs, it was surprising that twice as many recalls were sent out for dogs as for cats. It is also difficult to explain why clients with cats were more likely than clients with dogs to visit the clinic in response to a recall. These findings suggest that targeting more cat owning clients with recalls might increase return of these clients to a practice. The significantly better response to reminders for dental procedures, medical progress examinations, and laboratory testing compared with vaccinations may be a reflection of the changing opinions about the need for annual vaccinations.

A random effect term for clinic was included in the model to adjust covariate estimates and their standard errors, even though the variance estimate for this variable was not quite significant, because the clinics in this study were not selected at random (13). Practice type did not influence the results, regardless of how this effect was examined, which suggests that with this group of computerized practices, type of practice was not a significant predictor of client response to a recall notice. Although allowing for the small amount of extra-binomial variation in the data resulted in only very small changes to the sizes of the parameter estimates and their standard errors, the presence of significant extra-binomial variation suggests that there are likely to be certain clinic level factors not included in this study that may reflect how clinics handled recalls.

A major limitation of this retrospective computer data set was not knowing how the specific practices actually used the specified recall codes. The method of client contact for the recalls was not included in the data extraction. Clients could have been reminded by telephone calls, postcards, or letters. Combining information on the response rate and distribution of types of recall codes for each clinic revealed some clinic differences. For example, 1 of the small animal clinics (Alberta 3) with an overall response rate of 58% had the highest response rate to vaccination recalls as well as to recalls for dental procedures, medical progress examinations, and neutering while another small animal clinic (Saskatchewan) with an overall response rate of 32% had a very low response rate to neutering reminders and 1 of the lowest response rates for vaccination recalls.

Client retention, increasing the frequency of client visits and amount of services provided per visit are areas in which most practices can benefit from an expanded use of their computer systems (11). The results of this study support this observation. The successful communication of recommendations to clients, resulting in the provision of client services, requires repetition. Calhoun (11) mentions the "rule of 7" — on average, it takes 7 exposures to a new idea to create the desired response. These repetitions must be built into the practice management software for clients to respond positively to recommended procedures. Having invoice messages and recall codes linked with service codes provides a way of automatically reminding clients about recommended preventive care. The regression model revealed that clients responded to recalls for vaccination about 3 times less

often than for the other recall codes combined, suggesting that response to vaccination reminders needs improvement. It was not always apparent from the recall code descriptions whether the vaccination recall was for part of a puppy or kitten series or an annual or other booster. The apparent movement towards annual wellness examinations and reminders for preventive care services rather than simply continuing to offer annual vaccinations, which has become part of the current veterinary literature (14), was not apparent in the present data set. None of the clinics had any recalls extracted specifically for a physical examination for a healthy pet without a vaccination code.

This study showed that client response to a recall notice was significantly associated with several factors that could be used to guide changes in a clinic's reminder system to improve compliance with recommended preventive veterinary care. For example, targeting owners of multiple pets by offering a discount if they bring all of their pets in for annual wellness examinations or vaccinations during the same month could improve response rates of clients with more than one pet. Investigating the records of clients who have not been to the practice in the last year would reveal how long these clients have been with the practice, how long since their last visit, and what service was provided at that time. It might also indicate whether or not these clients should be considered inactive and either deleted from the system or be retained on the system for a limited time (such as a 3-year period). Efforts could then be made to determine whether these clients should be sent reminders, so that further resources are not wasted on sending out reminders to clients who have truly left the practice.

This retrospective study provided a large data set but not without problems. The data had to be checked for inconsistencies and some questions about the reliability of the search results were left unanswered. For example, it was unclear what proportion of clients could be considered active (had visited the clinic in the past year) versus inactive (not having visited the clinic in the past year, a number of years, or had changed veterinary clinics). This study emphasized the importance of regular maintenance of client databases and identified a possible problem with retention of inactive, unresponsive clients in a reminder system.

## Acknowledgments

The authors thank IVMS<sup>®</sup> (Innovative Veterinary Management System) in Saskatoon and the participating veterinary clinics for providing the data. CVJ

## References

1. Rockart JF, Hofmann PB. Physician and patient behavior under different scheduling systems in a hospital outpatient department. *Med Care* 1969;4:463–470.
2. Roth HP, Caron HS, Hsi BP. Estimating a patient's cooperation with his regimen. *Am J Med Sci* 1971;262:269–273.
3. Becker MH, Drachman RH, Kirscht JP. Predicting mothers' compliance with pediatric medical regimens. *J Pediatr* 1972;81:843–854.
4. Ross LV, Friman PC, Christophersen ER. An appointment-keeping improvement package for outpatient pediatrics: systematic replication and component analysis. *J Appl Behav Anal* 1993;26:461–467.
5. Bean AG, Talaga J. Appointment breaking: causes and solutions. *J Health Care Mark* 1992;12:14–25.

6. Casey R, Rosen B, Glowasky A, Ludwig S. An intervention to improve follow-up of patients with otitis media. *Clin Pediatr* 1985;24:149–152.
7. Cohen AJ, Weinstein P, Wurster C. The effects of patient-initiated phone confirmation strategies on appointment keeping at a hospital dental clinic. *J Public Health Dent* 1980;40:64–68.
8. Campbell JR, Szilagyi PG, Rodewald LE, Doane C, Roghmann KJ. Patient-specific reminder letters and pediatric well-child-care show rates. *Clin Pediatr* 1994;35:268–272.
9. Komoroski EM, Graham CJ, Kirby RS. A comparison of interventions to improve clinic follow-up compliance after a pediatric emergency department visit. *Pediatr Emerg Care* 1996;12:87–90.
10. Wolosin RJ. Effect of appointment scheduling and reminder post-cards on adherence to mammography recommendations. *J Fam Pract* 1990;30:542–547.
11. Calhoun BD. Practice Management Software: What's Cool and Useful — Parts I–II. *Proc North Am Vet Conf* 2001:500–502.
12. IVMS® (Innovative Veterinary Management System) [homepage on the internet]. Saskatoon: H. Kucharski c1997–2002. Available from [http:// www.ivms.ca](http://www.ivms.ca) Last accessed July 7, 2005.
13. Dohoo I, Martin W, Stryhn H. *Veterinary Epidemiologic Research*. Charlottetown: AVC Inc., 2003:499–520.
14. Waner T. A review of current international vaccination trends for dogs and cats. are we up to date and in-line with contemporary thinking? *Israel J Vet Med* 2004;59:33–38.